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Cutting Potassium in Dairy Feed Decreases Milk Fever in Cows

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Milk fever is an important metabolic disorder of dairy cows. At the onset of lactation – which occurs around time of calving – affected cows cannot maintain normal blood levels of calcium.

Dairy cows produce calcium-rich milk. In cows with milk fever, calcium leaves blood and enters milk faster than it can be replaced.

Serum calcium decreases to levels that do not support normal nerve and muscle function.

Cows that do not develop milk fever replenish blood calcium lost to milk by

increasing absorption of dietary calcium and withdrawing calcium from bones.

Cows with milk fever may suffer severe appetite loss and generalized weakness or may collapse. If left untreated, they may die. This bovine disease affects about 6 to 8 percent of all U.S. dairy cows annually, directly costing the dairy industry up to \$200 million per year.

With support from USDA's National Research Initiative (NRI) Competitive Grants Program, Agricultural Research Service scientists at the National Animal Disease Center in Ames, Iowa, are studying this disorder.

The researchers set out to determine whether the potassium, sodium, or calcium concentration in the ration fed to the cow just before calving influences the cow's susceptibility to milk fever. At the beginning of their research, dietary recommendations urged restricting calcium. However, field reports suggested that this calcium restriction might not be necessary.

Contrary to previous belief, the researchers demonstrated that dietary calcium is not a major risk factor for milk fever. Instead, diets high in potassi-

MILK FEVER IS RELATIVELY EASY TO CURE, BUT THE DAMAGE DONE TO A COW THAT HAS RECOVERED FROM MILK FEVER REDUCES THE LIFE SPAN OF THE COW BY 2.8 YEARS ON AVERAGE.



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um or sodium actually induce milk fever by increasing blood alkalinity.

Cows on diets high in potassium were found to have lower plasma concentrations of 1,25-dihydroxy vitamin D (important for intestinal calcium absorption) and lower plasma hydroxyproline (an index of the activity of bone calcium resorption).

This finding suggests that when the blood pH is high, the tissues of the animal become resistant to stimulation by parathyroid hormone. Because the tissues are resistant to this calcium-regulating hormone, the stimulation of bone calcium mobilization and intestinal calcium absorption is diminished.

Maintaining normal blood calcium levels is, under these conditions, not possible.

While diets high in sodium are not commonly fed to dry (prior to calving, non-lactating) cows, potassium is a positively charged mineral that is commonly found in high amounts in the forages that are included in dry cow rations. This research also indicates that the success of previously recommended low-calcium diets actually stemmed primarily from a reduction in dietary potassium, not calcium.

IMPACT

The anticipated benefits of this research to the dairy industry are enormous. These findings provide an easily managed feeding approach to the problem of milk fever. They are already changing the way U.S. cows are fed before calving – approximately half of all dairy farms in the U.S. are now following feeding guidelines derived from the results of this research.

The findings from this research will help curtail large economic losses due to milk fever. Additional economic benefits should include reductions in the incidence of other important dairy cattle diseases – such as ketosis and mastitis – for which cows with milk fever are at high risk.

Due to the widespread applicability of these findings, the results have been widely disseminated in numerous dairy industry publications including *Hoard's Dairyman*, *Dairy Today*, and *Dairy Herd Management*.

The research reported in this factsheet was sponsored by the Animal Health and Well-Being Program of the Animals Division of the National Research Initiative Competitive Grants Program. To be placed on the mailing list for this publication or to receive additional information, please contact the NRI (202/401-5022 or NRICGP@reeusda.gov). The factsheet also is accessible via the NRI section of the Cooperative State Research, Education, and Extension Service website (<http://www.reeusda.gov/nri>).

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